Math 5330 Homework 5
Spring 2009 **Factoring** (30 points, total)

Here are some random 7-digit numbers, one for each person in the class. Your number is the one following your initials.

MB	1505823	RG	1027999	SJ	1192345	MR	1582826	SS	6417436
RD	2484325	JG	3979856	JK	6854369	DR	3090578	DW	4767693
ME	5958404	MH	3042599	ML	8914675	CS	5297752	ext1	8185582
RF	4788058	ZH	2578724	MN	3752823	TS	6286489	ext2	9533292
BF	5525242	CI	3385551	EP	9242048	LS	1663355	ext3	2292870

1. Using Maple or Mathematica or a program of your own, factor 100 consecutive numbers starting with your given number.

2. How many of your 100 numbers are prime? How does this compare with the expected number of primes?

3. How many of your 100 numbers are squares? How does this compare with the expected number of squares?

4. Calculate the distribution of the number of distinct primes dividing each of your numbers. What is the mean and standard deviation of this distribution?
The last time I did this, the distribution for my 100 numbers: 7 primes, there were 24, 24, 25, 9, and 1 respectively with 2, 3, 4, 5, and 6 distinct prime divisors. My average was 3.08 distinct prime divisors, my standard deviation was 1.10.

5. The sizes of the primes dividing your numbers: How many have a prime divisor larger than $n^{3/4}$, $n^{1/2}$, $n^{1/3}$? What are the mean and standard deviation of the logarithm of the largest prime factor divided by the logarithm of n?
Again, when I last did this, I got the following: 32 had a prime larger than $n^{3/4}$, 64 had a prime larger than $\sqrt{n}$, and 96 had a prime larger than $n^{1/3}$. The mean of $\frac{\ln(p_{large})}{\ln n}$ was .636, and the standard deviation was .206

I will give 10 **extra** homework points to anyone who does the analysis on 1000 consecutive numbers rather than 100 numbers.